XRD and Filter Calibration Measurements

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Beamline(s): **U3C/X8A**

Introduction: AWE Plc operates a large laser facility named HELEN in the U.K. Several detector packages used to diagnose the emissions from experiments conducted on this laser utilise x-ray diodes. The response of the photocathodes and the transmissions of the filters from these x-ray diodes must be well characterized to provide good quality, reliable measurements. AWE operates an independent facility for the calibration of photocathodes and filters. The beamlines U3C and X8A were utilized to provide a means of cross checking the calibration measurements performed at AWE.

Methods and Materials: Seventeen newly manufactured photocathodes, two x-ray diodes (XRDs) and five filters were characterized. Their response was measured from 70eV to 5900eV using both the U3C and X8A beamlines. The measurements were performed using the silicon photodiode reference detector incorporated in the working chamber used on both beamlines.

Results: The measurements produced response characteristics for the new photocathodes, which will be used as the initial calibration in an ongoing investigation into the ageing of photocathodes, as well as their use in the laser plasma diagnostics. Cross check measurements are now being conducted at AWE. The results exhibited the characteristic response shape for each photocathode material as well as the usual surface contamination contribution.

Conclusions: It is hoped that the continued use of the U3C and X8A beamlines will result in a more complete understanding of the ageing process of photocathodes. Also the ability to cross check the AWE calibration measurements is deemed to be very valuable.